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10/566,521

09/25/2006

Volker Harle

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EXAMINER

SONG, MATTHEW J

ART UNIT

PAPER NUMBER

1714

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/566,521 | Applicant(s) HARLE, VOLKER | |
| | Examiner MATTHEW J. SONG | Art Unit 1714 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 February 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/30/06; 10/26/07; 6/11/09</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I, claims 1-17 in the reply filed on 2/1/2010 is acknowledged.
2. Claim 18 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 2/1/2010.

Information Disclosure Statement

3. The information disclosure statement filed 1/30/2006 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered. No copies of EP 0472221 A2, EP 1005067 A2, EP 0388733, or JP 05226781 are present in the case. Also, non-patent literature publications to Yang et al and Miyata et al are not present in the case.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 16 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 16 recites "lenslike" in line 4. "lenslike" is unclear because it is unclear what features are within the scope of "lenslike" or what features comprise "lenslike."

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-8 and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juergensen et al (WO 03054939 from IDS), where US 2005/0022725 is used as an accurate translation in view of Haerle (US 6,100,104).

Juergensen et al teaches a substrate with a growth surface ('725 [0002]); growing a non-closed mask material layer (SiN or SiO) onto the growth surface in such a way that the mask material has a plurality of windows having varying forms and/or opening areas and a mask material being selected so that semiconductor layer that is to be grown essentially cannot grow on the mask material or can grow in a substantially worse manner in comparison to the growth surface ('725 [0005]). Juergensen et al also teaches growth only in the region of the uncovered III-V surfaces at locations which are remote from each other ('725 [0005]), which clearly

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suggests simultaneously growing semiconductor layers to form structural elements on regions of the growth surface that lie within the windows.

Juergensen et al does not teach singulating the chip composite base with applied material to form semiconductor chips.

Haerle et al teaches a method for production of a plurality of optoelectronic semiconductor chips **100** each having a plurality of structural elements **21, 22, 23** with respective at least one semiconductor layer (Figs 5-6 and col 7, ln 1-67), the method comprising the steps of providing a chip composite base having a substrate **3** and a growth surface (col 6, ln 30-67 and Fig 1-3); growing a mask material layer **4** onto the growth surface in such a way that mask material layer has a plurality of windows and/or opening **10** (col 6, ln 30-67 and Fig 3), a mask material being chosen in such a way that a semiconductor material of the semiconductor layer that is to be grown in a later method step essentially cannot grow on the mask material or can grow in a substantially worse manner in comparison with the growth surface (col 6, ln 30-67 teaches SiO₂ or SiN and selective epitaxy such that monocrystalline growth on no mask portion and only polycrystalline growth, if any, on the mask) ; essentially simultaneously growing semiconductor layers on regions of the growth surface that lie within the windows (col 6, ln 30-67 teaches selective epitaxy within windows, thus clearly suggests simultaneously growing layers within the windows); and singulating the chip composite base with applied material to form semiconductor chips (col 7, ln 15-65 and Figs 5-6).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Juergensen et al with Haerle et al's teaching of singulating chips to form a

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plurality of semiconductor chips does not teach a mask material layer has a plurality of statistically distributed windows having varying forms and/or opening areas

Referring to claim 2, the combination of Juergensen et al and Haerle et al teaches the chip composite base has at least one semiconductor layer grown epitaxially onto the substrate and the growth surface is a surface on that side of the epitaxially grown semiconductor layer which is remote from the substrate.

Referring to claim 3, the combination of Juergensen et al and Haerle et al teaches the chip composite base ('104 fig 1-3, substrate wafer 19) has at least one semiconductor layer grown epitaxially onto the substrate ('104 col. 6, line 55 to col. 7, line 5).and the growth surface is a surface on that side of the epitaxially grown semiconductor layer ('104 fig 4, the bottom side of 21 is in contact with the main surface 9) which is remote from the substrate ('104 col. 6, lines 52-53)[claim 2].

Referring to claim 4, the combination of Juergensen et al and Haerle et al teaches the structural elements respectfully have an epitaxially grown semiconductor layer sequence ('104 col. 6, line 55 to col. 7, line 5) with an active zone that emits electromagnetic radiation ('104 fig 4, light-emitting active layer 23)[claim 4].

Referring to claim 5, the combination of Juergensen et al and Haerle et al teaches the mask material has SiO₂ or Al₂O₃ ('104 col. 6, lines 38-39)[claim 5] and '725 [0005]).

Referring to claim 6, the combination of Juergensen et al and Haerle et al teaches after the growth of the semiconductor layers (fig 5 is performed after fig 4), a layer made of electrically conductive contact material that is transmissive (front-side contact metallization layer 15, fig 5; it is transmissive because it would either bounce the radiation when a non-transparent

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material is used or pass the radiation through when a transparent material is used) to an electromagnetic radiation emitted by the active zone (fig 4, light-emitting active layer 23) is applied to the semiconductor layers, so that semiconductor layers of a plurality of structural elements are electrically conductively connected to one another by the contact material (front-side contact metallization layer 15)[claims 6 and 15].

Referring to claim 7, the combination of Juergensen et al and Haerle et al teaches the average thickness of the mask material layer ('104 fig 9, mask layer 4) is less than the cumulated thickness of the semiconductor layers of a structural element ('104 fig 9, semiconductor layer sequence 18)[claim 7] and '725 [0005]).

Referring to claim 8, the combination of Juergensen et al and Haerle et al teaches the mask material layer is at least partly removed after the growth of the semiconductor layers (col. 7, lines 13-20)[claim 8].

Referring to claims 12-13, the combination of Juergensen et al and Haerle et al teaches the growth conditions for the growth of the semiconductor layers is set so that three dimensional growth is predominant and the mask material layer is predominantly formed from a plurality of three dimensionally growing crystallites ('104 col. 7, lines 66-67 and Fig 5, [claim 12] and '725 [0005] and [0010]). Also, the planar as in that the mask layer covers the entire substrate and is an accretion of planar layers ('104 Fig 5 and '725 [0005], [0010]).

Referring to claim 14-15, the combination of Juergensen et al and Haerle et al teaches openings of nanometers to micrometers ('725 [0011]).

Referring to claim 16, the combination of Juergensen et al and Haerle et al teaches windows which growth of semiconductor takes place of different shapes ('725 Figs 1-2), thus it

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would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Juergensen et al and Haerle et al by forming a lenslike shape because changes in shape are prima facie obvious and the combination of Juergensen et al and Haerle et al clearly suggests different shapes are obvious.

Referring to claim 17, the combination of Juergensen et al and Haerle et al teaches MOVPE ('104 col 6, ln 30-67 and '725 claim 12).

8. Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Juergensen et al (WO 03054939 from IDS), where US 2005/0022725 is used as an accurate translation in view of Haerle (US 6,100,104) as applied to claims 1-8 and 12-17 above, and further in view of Braun et al (US 6,110,277).

The combination of Juergensen et al and Haerle et al teaches all of the limitations of claim 9, as discussed previously, except after growth of the semiconductor layer sequences, a planarization layer is applied over the growth surface.

Braun et al teaches after the growth of semiconductor layers a planarization layer is applied over the growth surface (Fig 5, passivation layer 60) to protect the light emitting diode.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Juergensen et al and Haerle et al by using a planarization layer to make a light emitting diode with good efficiency and optimized green, blue and violet spectral region.

Referring to claims 10-11, the combination of Juergensen et al, Haerle et al and Braun et al teaches a dielectric material is chosen for the planarization layer and a material whose

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refractive index is lower than that of the semiconductor layers is chosen for the planarization layer (Fig 5, the passivation layer 60 must have a refractive index that is lower than the semiconductor layers to allow the radiation to pass through, otherwise the radiation is blocked).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. SONG whose telephone number is (571)272-1468. The examiner can normally be reached on M-F 11:00-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
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/Matthew J Song/

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